

## Comparison of U.S. Hearing Conservation Regulations and Recommendations

The table permits a quick comparison of the hearing conservation requirements of US general industry (OSHA, 1983), mining (MSHA, 1999), and the most recent recommendations of NIOSH (1998). Please note following conditions for use of this table.

1. The MSHA regulation was published September 13, 1999 with an effective date of September 13, 2000. This table is current as of spring 2000 but litigation could cause changes before implementation. Check with MSHA (see web address below) for latest status.
2. The NIOSH *Criteria Document* is a recommendation, not a compliance document, but can be construed as a “best practices” guide.
3. Recordable or reportable hearing loss is addressed under OSHA in 29 CFR 1904, and directly in the MSHA rule.

This analysis is not intended to be all-inclusive; please check with the applicable agency for updates and current status. OSHA information is available at <<http://www.osha.gov>>; MSHA at <<http://www.msha.gov>>; and NIOSH at <<http://www.cdc.gov/niosh>>.

Issue	Description and Definition	OSHA 29 CFR 1910.95	MSHA 30 CFR Part 62	NIOSH Pub. No. 98-126
Action Level (AL)	The time-weighted average (TWA) exposure which requires program inclusion, hearing tests, training, and optional hearing protection	AL = 85 dBA TWA. AL is exceeded when TWA $\geq$ 85 dBA, integrating all sounds from 80 – 130 dBA.	Similar to OSHA, except integration is for all sounds from 80 to at least 130 dBA.	Does not have AL; rather has a single Recommended Exposure Limit (REL, see next row) for hearing loss prevention, noise controls, and HPDs.
Permissible Exposure Limit (PEL)	The TWA, which when exceeded, requires feasible engineering and (MSHA)/or (OSHA) administrative controls, and mandatory hearing protection.	PEL = 90 dBA TWA. PEL is exceeded when TWA > 90 dBA, integrating all sounds from 90 – 140 dBA, as inferred from Table G-16 of 1910.95(b).	Similar to OSHA, except integration range is explicit in the reg. (62.101, Definitions), and is for all sounds from 90 to at least 140 dBA.	REL = 85 dBA TWA. REL is exceeded when TWA $\geq$ 85 dBA, integrating all sounds from 80 - 140 dBA
Exchange Rate	The rate at which exposure accumulates; the change in dB TWA for halving/doubling of allowable exposure time.	5 dB	Same as OSHA.	3 dB
Ceiling Level	The limiting sound level above which employees cannot be exposed.	No exposures > 115 dBA; generally interpreted as “no <i>unprotected</i> exposures” to give credit for HCP, HPDs and feasible engineering controls.	“P” code violation issued for any protected or unprotected exposures > 115 dBA.	No protected or unprotected exposure to continuous, varying, intermittent, or impulsive noise > 140 dBA.
Impulse Noise	Noise with sharp rise and rapid decay in level, $\leq$ 1 sec. in duration, and if repeated, occurring at intervals > 1 sec.	To be integrated with measurements of all other noise, but <i>should</i> not exceed 140 dB peak SPL.	To be integrated with measurements of all other noise.	To be integrated with measurements of all other noise, but not to exceed 140 dBA.

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Monitoring	Assessment of noise exposure.	Once to determine risk and HCP inclusion; from there as conditions change resulting in potential for more exposure.	Mine operator must establish system to evaluate each miner's exposure sufficiently to determine continuing compliance with rule.	Every 2 years if any exposure $\geq 85$ dBA TWA.
Noise Control	Investigation and implementation of feasible engineering and administrative control measures.	Feasible controls required where TWA > 90 dBA; subsequent compliance policy (which may be changed/revoked by OSHA at any time) permits proven effective HCP in lieu of engineering where TWA < 100 dBA.	Feasible engineering and administrative controls required for TWA > 90 dBA; even if controls do not reduce exposure to the PEL, they are required if feasible (i.e. $\geq 3$ -dBA reduction). Administrative controls must be provided to the miner in writing and posted.	Feasible controls to 85 dBA TWA. Administrative controls must not expose more workers to noise.
Hearing Protection	Exposure requirements and conditions for use of hearing protection devices (HPDs).	Optional for $\geq 85$ dBA TWA; mandatory for > 90 dBA TWA, and for $\geq 85$ dBA TWA for workers with STS. Protect to 90 or to 85 with STS. Choices must include a "variety" which is interpreted as at least 1 type of plug and 1 type of muff.	Use requirements same as OSHA, but amount of protection not specified, and choices must include 2 plugs and 2 muffs. Double hearing protection (muff plus plug) required at exposures >105 dBA TWA.	Mandatory for $\geq 85$ dBA TWA; must protect to 85. Double hearing protection (muff plus plug) recommended at exposures > 100 dBA TWA.
Evaluation of Hearing Protector Effectiveness	Method of assessing adequacy of HPDs	Use manufacturers' labeled NRRs to assess adequacy, but subsequent compliance policy stipulates 50% derating of NRRs to compare relative effectiveness of HPDs and engineering controls.	No method included in standard. Preamble to regulation indicates that compliance guide will follow with suggested procedures.	Labeled NRRs must be derated by 25% for muffs, 50% for foam plugs, and 70% for other earplugs unless data available from ANSI S12.6-1997 Method B.

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Supervisor of Audiometric Testing	The person who is responsible for the conduct of audiometric testing, and is the reviewer of audiograms.	Licensed or certified audiologist, otolaryngologist, or other physician	Licensed or certified audiologist, or physician.	Audiologist or physician.
Audiometric Technician	The person who conducts audiometric testing and routine review under guidance of professional supervisor.	Must be responsible to supervisor (see above). CAOHC certified, or has demonstrated competence to supervisor. When microprocessor audiometers used, certification not required.	Must be under direction of supervisor (see above). Must be certified by CAOHC or equivalent certification organization.	Must be under direction of supervisor (see above). Must be certified by CAOHC or equivalent certification organization.
Audiometry	Initial and ongoing hearing tests used to assess the efficacy of hearing conservation measures.	Required annually for all workers exposed $\geq$ 85 dBA TWA. Baseline test within 6 months of exposure; 12 months if using mobile testing service, with HPDs in the interim	Same as OSHA, but choice of whether or not to take an audiogram is at miner's discretion.	Required for all workers exposed $\geq$ 85 dBA TWA. Baseline test pre-placement or within 30 days of exposure. Best practice is to test workers exposed $>$ 100 dBA TWA twice per year.
Quiet Period Prior to Baseline Audiogram.	Period of non exposure to workplace noise required prior to baseline audiogram.	14 hrs.; use of HPDs acceptable as alternative.	Same as OSHA.	No exposure to noise $\geq$ 85 dBA for 12 hrs.; HPDs can not be used as alternative.
Background Noise	Permissible noise in audiometric test chamber during testing.	Levels specified as 40 dB @ 500 and 1000 Hz, 47 dB @ 2000 Hz, 57 dB @ 4000 Hz, and 62 dB @ 8000 Hz.	According to scientifically validated procedures.	Per ANSI S3.1-1999 or latest revision; 19 dB more stringent than OSHA at 500 Hz, and 13 to 25 dB more stringent at other frequencies.
Audiogram Review and Employee Notification	Required actions following audiograms.	Not specified unless STS is detected; see STS follow up.	Audiograms must be reviewed within 30 days and feedback provided in writing to each miner within 10 days thereafter.	Not specified unless STS is detected; see STS follow up.

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STS (OSHA/MSHA – <i>Standard</i> Threshold Shift; NIOSH – <i>Significant</i> Threshold Shift)	A change in hearing compared to an earlier (baseline) hearing test that requires follow-up action.	≥ 10-dB average shift from baseline hearing levels at 2000, 3000 and 4000 Hz in either ear.	Same as OSHA.	≥ 15-dB shift for the worse from baseline at any test frequency, in either ear, confirmed with follow-up test for same ear/frequency.
STS Retests	Follow-up audiogram that is permitted or required when initial STS is detected.	May obtain retest within 30 days and substitute for annual audiogram.	Same as OSHA.	Must provide confirmation audiogram within 30 days.
STS Follow-up	Required actions when an STS is detected.	Notify worker within 21 days; unless STS is not work-related, must fit or re-fit employee with HPDs and select higher attenuation if necessary, refer for audio/otological exam if more testing needed or problem due to HPDs, and inform employee of need for exam if problem unrelated to HPD usage is suspected.	Notify worker within 10 days; unless STS is not work-related, must retrain the miner, provide miner an HPD or a different HPD, and review effectiveness of any engineering and administrative controls to correct deficiencies.	Notify worker within 30 days; must take action such as explain effects of noise, reinstruct and refit with HPDs, provide additional training in hearing loss prevention, or reassign to quieter area.
Baseline Revision	Procedures for revising the baseline audiogram to reflect changes in hearing.	Annual audio substituted for baseline when STS is <i>persistent</i> or thresholds show significant improvement.	Annual audio substituted for baseline when STS is <i>permanent</i> or thresholds show significant improvement.	Annual audio substituted for baseline when confirming audiogram validates an STS.
Presbycusis or Age Correction	Adjustments for hearing levels for anticipated effects of age.	Allowed.	Same as OSHA.	Not allowed.
Recordable or Reportable Hearing Loss	Amount of hearing loss triggering reporting requirements on workplace injury/illness logs.	By OSHA directive, ≥ 25-dB average shift from original baseline at 2000, 3000, and 4000 Hz, in either ear, w/age correction; rule change pending.	≥ 25-dB average shift from baseline, or revised baseline, at 2000, 3000, and 4000 Hz in either ear.	Not indicated.

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Training and Education	Description of the annual training and educational component of the hearing conservation program.	Annual for all employees exposed $\geq 85$ dB TWA; include effects of noise, HPDs, and purpose and explanation of audiometry.	Same as OSHA, except must begin within 30 days of enrollment in HCP, and include description of mine operator and miner's responsibilities for maintaining noise controls.	Same as OSHA, but must also include psychological effects of noise, and roles and responsibilities of both employers and workers in program.
Warning Signs and Postings	Requirements to post signs for noisy areas or to post regulations.	Hearing conservation amendment shall be posted in workplace.	No requirements for posting reg., but when administrative controls are utilized the procedures must be posted.	Signs must be posted at entrance to areas with TWAs routinely $\geq 85$ dBA.
Record Retention	Specification on retention of data, and transfer requirements if employer goes out of business.	Noise surveys for at least 2 yrs., hearing tests for duration of employment, with requirement to transfer records to successor if employer goes out of business.	Employee noise exposure notices and training records for duration of enrollment in HCP + 6 months, and hearing tests for duration of employment + 6 months, with requirement to transfer records to successor mine operator.	Noise surveys for 30 yrs., hearing tests for duration of employment + 30 yrs., calibration records for 5 yrs, with record transfer per 29CFR1910.20(h).

## REFERENCES

MSHA (1999). "Health Standards for Occupational Noise Exposure; Final Rule," 30 CFR Part 62, Vol. 64 (176), Fed. Reg., 49548-49634, 49636-49637.

NIOSH (1998). "Criteria for a Recommended Standard - Occupational Noise Exposure, Revised Criteria 1998," U. S. Dept. HHS (NIOSH) Pub. No. 98-126, Cincinnati, OH.

OSHA (1983). "Occupational Noise Exposure; Hearing Conservation Amendment; Final Rule," 29CFR1910.95 Fed. Regist. 46(162) 42622-42639.